

**REPORT ON THE INVESTIGATION
OF
SUBSURFACE PETROLEUM CONTAMINATION**

AT

**CHITTENDEN MILLS BEVERAGE
ROUTE 15
JERICHO, VERMONT**

VT DEC SITE #94-1594

SEPTEMBER 1994

PREPARED FOR:

**CHAMPLAIN OIL COMPANY
PO BOX 2126
SOUTH BURLINGTON, VERMONT 05403**

PREPARED BY:

**Griffin International Inc.
PO Box 943 / 19 Commerce Street
Williston, VT 05495
(802) 865-4288**

Griffin Project #6944538

47-159-1000

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I. INTRODUCTION

This report describes the investigation of subsurface petroleum contamination at Chittenden Mills Beverage located on Route 15 in Jericho, Vermont. This investigation was conducted by Griffin International Inc. (Griffin) for Champlain Oil Company (COCO) of South Burlington, VT. This investigation was requested by the State of Vermont Department of Environmental Conservation (VTDEC) on July 26, 1994 in a letter to Dennis Boise, COCO, from Mr. Richard Spiese, Acting Supervisor of the VTDEC Sites Management Section. Residual subsurface petroleum was detected during gasoline underground storage tank (UST) replacement on April 20 and 21, 1994.

II. SITE DESCRIPTION

The site (VTDEC Site #94-1594) is located in a mixed commercial and residential area on Route 15, in Jericho, VT (See Site Location Map in Appendix A.). The site is occupied by a convenience store located in a single building. The site is at an approximate elevation of 520 feet above sea level and is generally flat. Bedrock at the site was identified during UST removal at 6 to 12 feet below the surface.

The Lee River is located approximately 200 feet east and southeast of the site and flows towards the south in this area. Residences abut the subject property on the west and north. Northeast of the site is an old mill building which is occupied by a retail shop. South of the site, across Route 15, is Keith Agency which is a real-estate office. The site and surrounding area is served by the Champlain Water District.

There is currently one UST at the site. The 10,000 gallon capacity, two compartment, dual steel wall UST was installed in April 1994 and is used for gasoline storage.

Two 4" diameter PVC monitoring wells are located near the UST. These wells were installed during the installation of the UST. MW1 is located directly east of the UST and south of the pump island. MW2 is located directly west of the UST (see Site Map in Appendix A, Drawing #2). Both monitoring wells are located in the pit area of the four former USTs that were removed in April 1994.

III. INVESTIGATIVE PROCEDURES

To better define the extent of subsurface petroleum contamination at the site, Griffin collected water samples from the two on-site monitoring wells and from the Lee River located presumably down gradient from the site. Griffin also screened the 25 cubic yard soil stockpile located at Weston's Gravel Pit, which resulted from excavation during UST replacement.

A. Water Table Measurements And Groundwater Flow

The water table elevation in each monitoring well was measured on September 8, 1994. The water table in the area was measured at approximately eight feet below the surface. The water table elevations are based on an arbitrary datum by assigning an elevation of 100 feet to the top of the MW1 well casing. Water table elevations are plotted on the Groundwater Elevation Map in Appendix A, Drawing #3. Since only two wells were sampled, the groundwater flow and gradient can not be directly measured. Since topography slopes steeply to the valley of the Lee river which is located several vertical feet below the elevation of the site and topography rises moderately north and west of the site, it can be assumed that groundwater at the site flows approximately southeast to south towards the Lee River.

No free product was detected in any of the monitoring wells.

B. Groundwater Sampling and Analysis

On September 8, 1994, Griffin collected groundwater samples from the two on-site monitoring wells. Griffin also collected two water samples from the Lee River. One river water sample was collected from directly south of the abutment to the bridge where Route 15 crosses the Lee River. The other river water sample was collected approximately 200 feet south and down stream of the bridge. All samples were collected according to Griffin's water sampling protocol. All samples were submitted to a laboratory where they were analyzed for Volatile Organic Compounds (VOCs) according to EPA Method 602. Laboratory results are summarized below in Table 1. Laboratory report forms are presented in Appendix B. Duplicate, trip blank, and equipment blank samples collected during the sampling indicate that adequate quality assurance/quality control was maintained during sample collection and analysis.

Analysis of the groundwater sample collected from MW1 indicates the presence of methyl tertiary butyl ether (MTBE) in concentration of 58,500 parts per billion (ppb) which exceeds the Vermont Groundwater Enforcement Standard (VGES) of 40 ppb. MTBE is an octane boosting additive used in the production of most gasoline since 1980. MTBE is at least 20 times more water soluble than other gasoline compounds. Analysis also indicates the presence of benzene and toluene in respective concentrations of 1,240 ppm and 1,010 ppb which exceed the VGES of 5.0 ppb for benzene and 1,000 ppb for toluene. Xylenes were indicated in concentration below VGES.

Analysis of the water sample collected from MW2 indicate the presence of MTBE and Benzene in concentrations above VGES. MTBE was indicated in concentration of 3,430 ppb; benzene was indicated in concentration of 422 ppb. Concentrations of ethyl benzene, toluene, and xylenes were also indicated in concentrations below VGES.

Analyses of the both water samples collected from the Lee River indicate no detectable petroleum compounds.

TABLE 1.

**Groundwater Quality Summary
Chittenden Mills Beverage
Jericho, Vermont**

Monitoring Date: 9/8/94

All Values Reported in ug/L (ppb)

PARAMETER	Date of Sample Collection				V.G.E.S.
	MW1	MW2	MW3	MW4	
Benzene	1,240.	422.	ND > 1	ND > 1	5.0*
Chlorobenzene	ND > 500	ND > 25	ND > 1	ND > 1	100**
1,2-DCB	ND > 500	ND > 25	ND > 1	ND > 1	600*
1,3-DCB	ND > 500	ND > 25	ND > 1	ND > 1	600**
1,4-DCB	ND > 500	ND > 25	ND > 1	ND > 1	75*
Ethylbenzene	ND > 500	184.	ND > 1	ND > 1	700**
Toluene	1,010.	508.	ND > 1	ND > 1	1,000**
Xylenes	636.	500.	ND > 1	ND > 1	10,000**
Total BTEX	2,886.	1,614.			-
MTBE	58,500.	3,430.	ND > 10	ND > 10	40**
BTEX + MTBE	61,386.	5,044.			-

V.G.E.S. - Vermont Groundwater Enforcement Standards

* - Maximum Contaminant Level

ND > - None Detected Above Stated Limits

** - Health Advisory Level

TBQ - Trace, below quantitation limits

ANALYSIS BY EPA METHOD 602

C. Soil Screening

On September 8, 1994, Griffin screened the soil stockpile which resulted from excavation associated with the UST replacement on April 20 and 21, 1994. Samples were collected from a depth of approximately 2.5 to 3.0 feet by hand augering. Soil samples were placed and sealed in plastic bags. The head space of each sample was screened for the presence of VOCs using an Photo-Vac Micro-Tip photo ionization detector (PID). The PID was calibrated with isobutylene with reference to benzene. The presence of VOCs was indicated in concentrations ranging between 2.5 and 42.9 ppb. The average PID response was 12.5 ppb.

IV. RECEPTOR SURVEY AND RISK ASSESSMENT

On September 8, 1994, Griffin conducted a visual survey of the site and vicinity of Weston's Gravel Pit to identify local potential receptors of any subsurface petroleum contaminants. The most likely receptor in the vicinity of Chittenden Mills Beverage appears to be the Lee River located approximately 200 feet to the east of the site. The surface and bank of Lee River were inspected for signs of petroleum and two water samples were collected for analysis as described above. No petroleum contamination was evident. The risk of impact to the Lee River from residual subsurface petroleum at the site is minimal due to the distance from the site.

Indoor air screening was conducted at Chittenden Mills Beverage and in the Basement of the Keith Agency on September 8, 1994. No VOCs were detected. The risk of VOC vapor migration into the Chittenden Mills Beverage buildings is minimal, since the building is concrete slab construction.

Municipal water serves the relative area including the subject property and adjacent establishments. There is no risk of contamination to the municipal water supply from residual subsurface petroleum at the site, since the water supply for Jericho is Lake Champlain located several miles from the site. No water supply wells were identified in the direct vicinity of the site.

On July 5, 1994, Griffin reviewed records at the VTDEC Water Supply Division to identify water supply wells in the area surrounding the site and Weston's Gravel Pit. Two supply wells are located approximately 0.25 miles northeast of the site. The deep bedrock wells are presumably up-gradient from the site. Six bedrock supply wells were identified between 0.25 and 0.5 miles from the site. None of the wells appeared to be downgradient from the site.

Two residential supply wells were located in the vicinity of the soil stockpile at Weston's Gravel Pit. One well is located 250 feet east-northeast of the stockpile; the other well is located 350 feet south-southwest of the stockpile. No surface water is located in the vicinity of the stockpile.

V. CONCLUSIONS

On the basis of this investigation, Griffin has concluded the following:

- 1) There has been a release or releases of petroleum to the subsurface at this site in the past. The amounts and duration of the release(s) are unknown. It appears that gasoline release to the subsurface was likely due to tank overfills and from piping near the former pump island. Recently upgraded piping and overfill protection will prevent future releases of product to the subsurface.
- 2) The release(s) have resulted in contamination to soil and groundwater in the vicinity of the on-site USTs. No free product was detected in either of on-site monitoring wells.
- 3) Groundwater apparently likely flows south-southeast towards the Lee River.
- 4) Benzene and MTBE were indicated in concentrations above VGES by analyses of the groundwater sample collected from MW1 and MW2. Toluene was indicated in concentrations slightly above VGES by analysis of the groundwater sample collected from MW1.
- 5) VOCs were detected in the 25 cubic yard soil stockpile located at Weston's Gravel Pit. VOC concentrations averaged 12.5 ppm.
- 6) No receptors were found to be significantly impacted by petroleum contamination at the site.
- 7) Two supply wells were identified approximately 0.25 miles northwest of the site. The wells do not appear to be at risk from subsurface contamination at the site because of they do not appear to be downgradient.
- 8) Two supply wells were identified in the vicinity of Weston's Gravel Pit. The nearest well is 250 feet from the stockpile.
- 9) Contaminant concentrations in the subsurface should gradually be reduced by the natural processes of dilution, dispersion, and biodegradation.
- 10) Contaminant concentrations in the soil stockpile should gradually be reduced by the natural process of biodegradation and photo degradation.

VI. RECOMMENDATIONS

On the basis of the above conclusions, Griffin recommends the following:

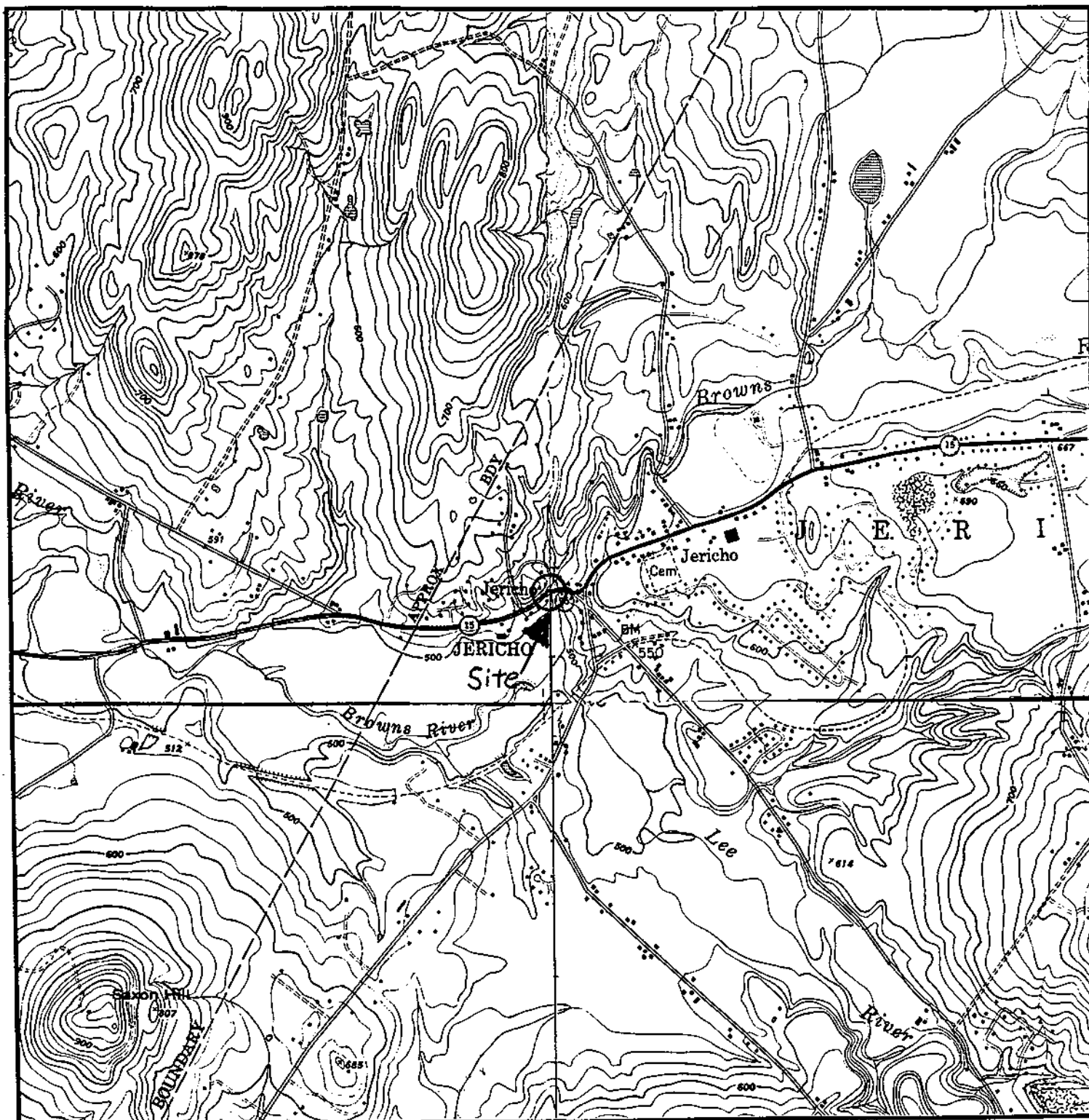
1) To document a trend of groundwater quality improvement at the site, Griffin recommends that the on-site monitoring wells be resampled in the Spring of 1995.

2) The soil stockpile located at Weston's Gravel Pit should be moved to the north side of the gravel pit where there is not significant risk to sensitive receptors. The stockpile should be placed on and covered with plastic sheeting. The stockpile should be screened annually using a PID to monitor the progress of passive treatment. After no VOCs are detectable by PID in the soil stockpile, a composite sample should be collected and analyzed for petroleum compounds by EPA Method 8020. After analysis indicates VOC concentrations are below 20 times VGES, the stockpile can be spread and seeded at Weston's Gravel Pit after approval from VTDEC.

3) Since on sensitive receptors appear to be significantly effected by the residual petroleum, active remediation at this site is not recommended.

APPENDIX A

SITE LOCATION MAP
SITE MAP
GROUNDWATER ELEVATION MAP
CONTAMINANT DISTRIBUTION MAP



SOURCE: USGS UNDERHILL, VT QUADRANGLE, 1983
 USGS ESSEX CENTER, VT QUADRANGLE, 1986
 USGS ESSEX JUNCTION, VT QUADRANGLE, 1987
 USGS RICHMOND, VT QUADRANGLE, 1980

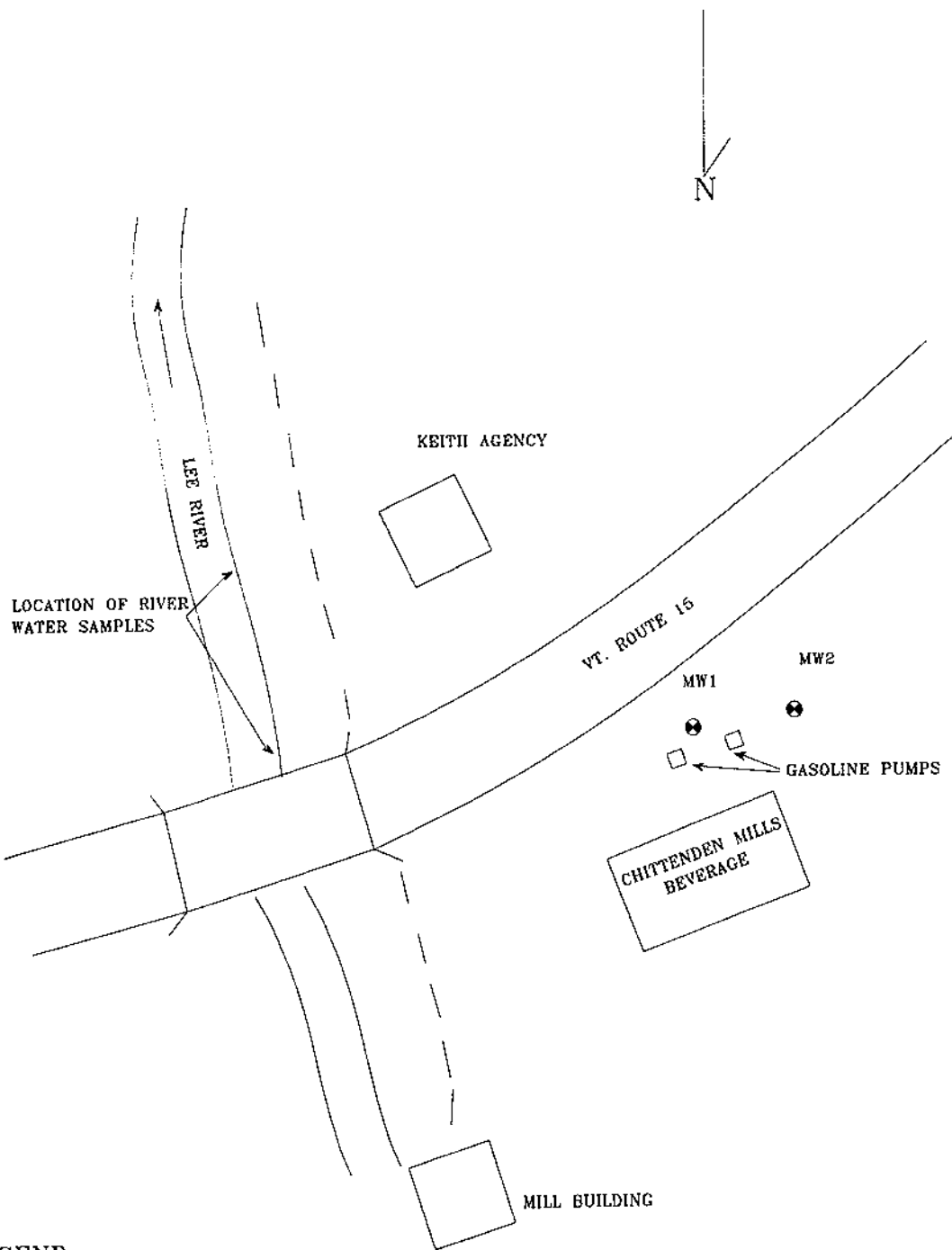


CHITTENDEN MILLS BEVERAGE

NEWPORT, VERMONT
 SITE LOCATION MAP

SCALE: APPROX 1:24,000

DWG. #: 1



LEGEND

⊙ MW8 MONITORING WELL

JOB #: 8944538
SAMPLE DATE: 9/8/94



CHITTENDEN MILLS BEVERAGE

NEWPORT,

VERMONT

SITE MAP

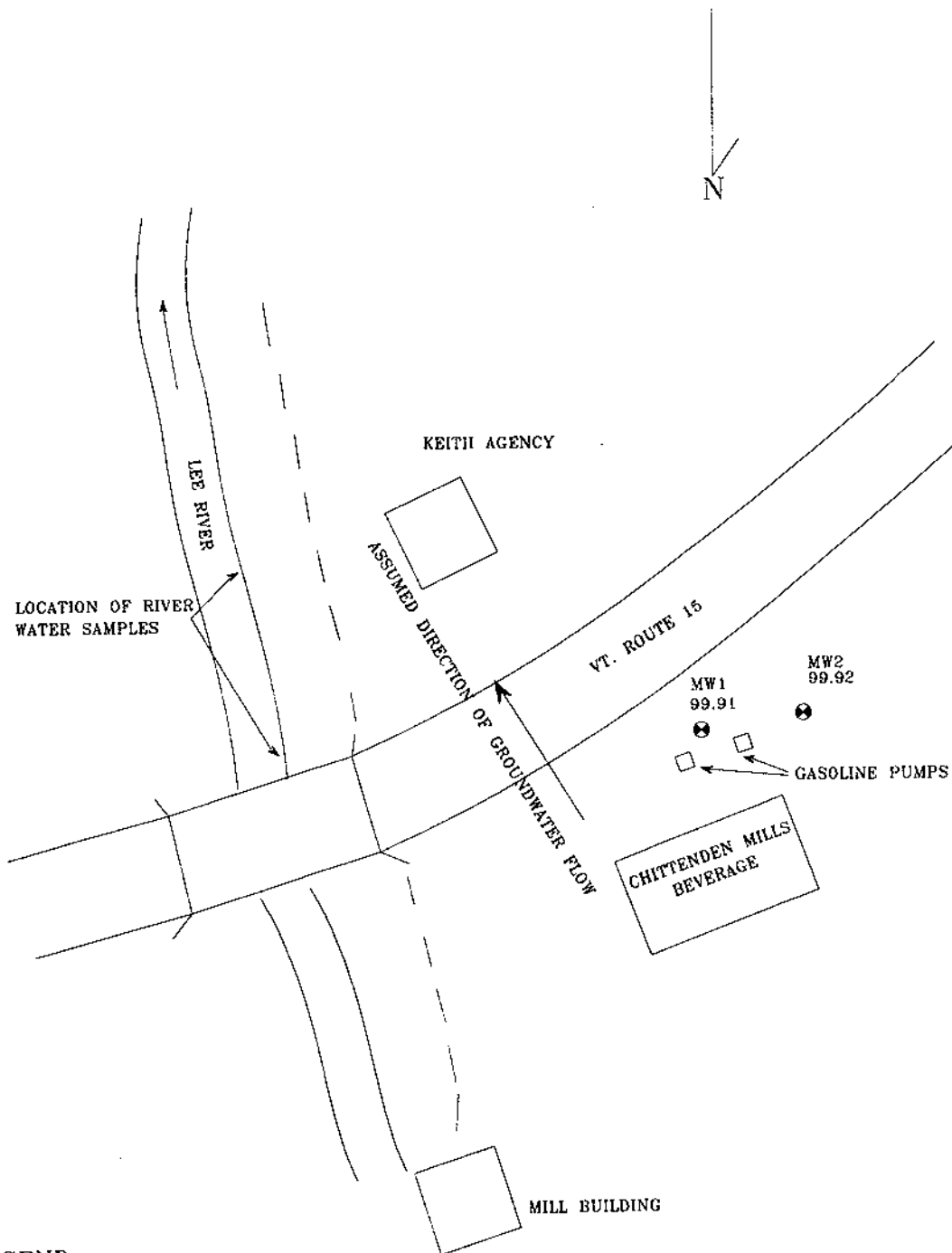
DATE: 9/19/94

DWG. #: 2

SCALE: 1"=50'

DRN: LR

APP: LR



LEGEND

MWB MONITORING WELL
 95.03' RELATIVE ELEVATION OF WATER TABLE

JOB #: 8944538
 SAMPLE DATE: 9/8/94



CHITTENDEN MILLS BEVERAGE

NEWPORT, VERMONT

GROUNDWATER ELEVATION MAP

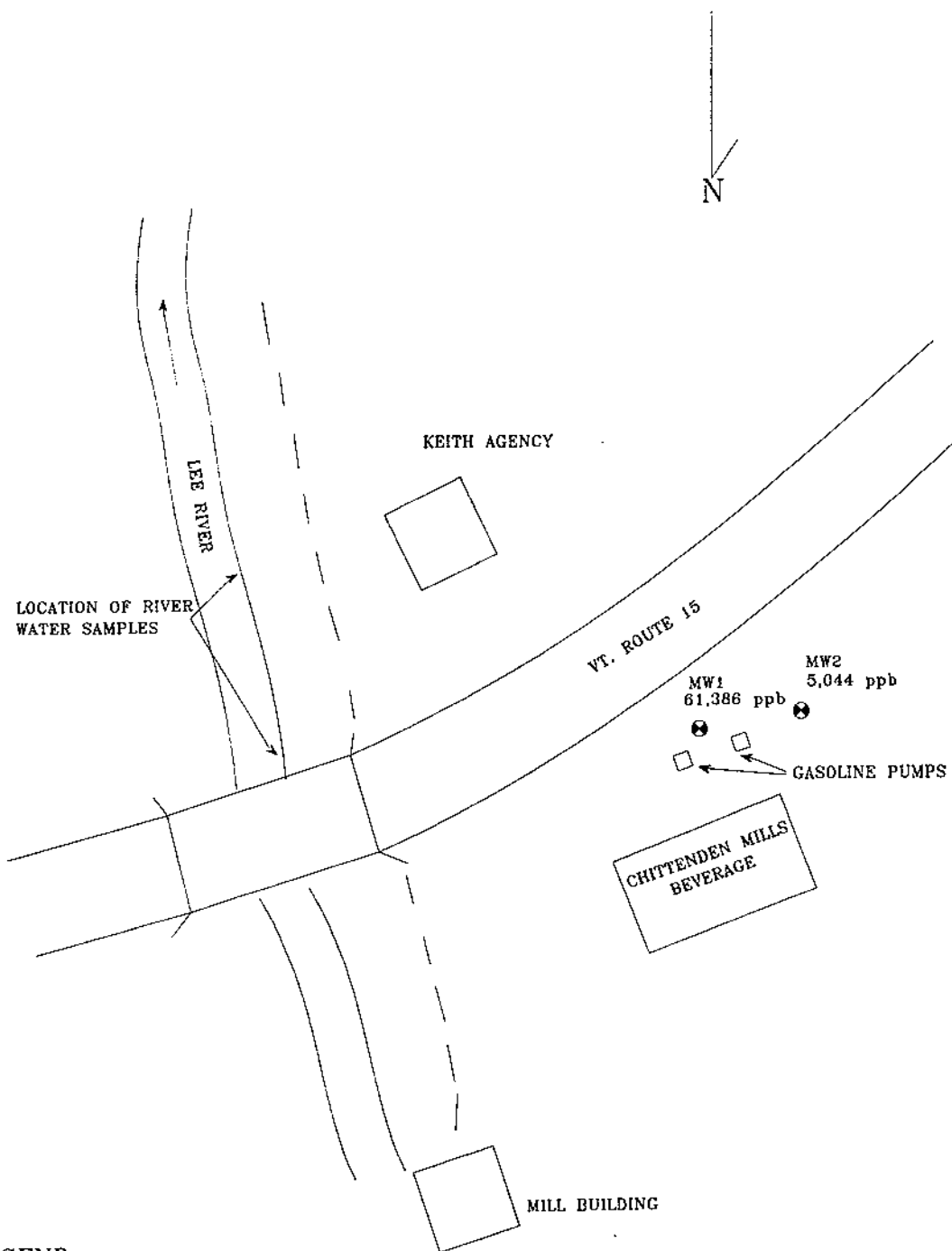
DATE: 9/19/94

DWG.#: 3

SCALE: 1"=50'

DRN: LR

APP: LR



LEGEND

⊕ MW8 MONITORING WELL
 1.7 ppb TOTAL BTEX + MTBE CONCENTRATION

JOB #: 8944538
 SAMPLE DATE: 9/8/94



CHITTENDEN MILLS BEVERAGE

NEWPORT,

VERMONT

CONTAMINANT DISTRIBUTION MAP

DATE: 9/19/94

DWG.#: 4

SCALE: 1"=50'

DRN: LR

APP: LR

APPENDIX B

LABORATORY RESULTS



Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994

PROJECT CODE: GICM1340
REF.#: 64,149 - 64,155

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated samples were preserved with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



Laboratory Services

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FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,149
STATION: MW-1
TIME SAMPLED: 9:10
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	500	1,240.
Chlorobenzene	500	ND ²
1,2-Dichlorobenzene	500	ND
1,3-Dichlorobenzene	500	ND
1,4-Dichlorobenzene	500	ND
Ethylbenzene	500	ND
Toluene	500	1,010.
Xylenes	500	636.
MTBE	5000	58,500.

Bromobenzene Surrogate Recovery: 114%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 6

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 0.2% dilution.
- 2 None detected



ENDYNE, INC.

Laboratory Services

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,150
STATION: MW-2
TIME SAMPLED: 8:50
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	25	422.
Chlorobenzene	25	ND ²
1,2-Dichlorobenzene	25	ND
1,3-Dichlorobenzene	25	ND
1,4-Dichlorobenzene	25	ND
Ethylbenzene	25	184.
Toluene	25	508.
Xylenes	25	500.
MTBE	250	3,430.

Bromobenzene Surrogate Recovery: 103%

NUMBER OF UNIDENTIFIED PEAKS FOUND: > 10

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 4% dilution.
- 2 None detected



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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,151
STATION: River #1
TIME SAMPLED: 9:45
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 98%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,152
STATION: River #2
TIME SAMPLED: 9:35
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 98%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,153
STATION: Trip Blank
TIME SAMPLED: 7:15
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 96%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,154
STATION: Equipment Blank
TIME SAMPLED: 9:20
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 96%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected

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FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 8, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 12, 1994

PROJECT CODE: GICM1340
REF.#: 64,155
STATION: Duplicate (MW-1)
TIME SAMPLED: 9:10
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	500	1,180.
Chlorobenzene	500	ND ²
1,2-Dichlorobenzene	500	ND
1,3-Dichlorobenzene	500	ND
1,4-Dichlorobenzene	500	ND
Ethylbenzene	500	ND
Toluene	500	1,000.
Xylenes	500	707.
MTBE	5000	52,600.

Bromobenzene Surrogate Recovery: 105%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 6

NOTES:

- 1 Detection limit raised due to high levels of contaminants. Sample run at 0.2% dilution.
- 2 None detected

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EPA METHOD 602 LABORATORY REPORT

MATRIX SPIKE AND DUPLICATE LABORATORY CONTROL DATA

CLIENT: Griffin International
PROJECT NAME: Chittenden Mills
REPORT DATE: September 12, 1994
DATE SAMPLED: September 7, 1994
DATE RECEIVED: September 8, 1994
ANALYSIS DATE: September 9, 1994

PROJECT CODE: GICM1340
REF.#: 64,152
STATION: River #2
TIME SAMPLED: 9:35
SAMPLER: J. Bernhard

<u>Parameter</u>	<u>Sample(ug/L)</u>	<u>Spike(ug/L)</u>	<u>Dup1(ug/L)</u>	<u>Dup2(ug/L)</u>	<u>Avg % Rec</u>
Benzene	ND ¹	10	10.7	10.3	105%
Toluene	ND	10	9.9	9.6	98%
Ethylbenzene	ND	10	10.1	9.9	100%
Xylenes	ND	30	29.9	29.0	98%

NOTES:

1 None detected

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* 32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

CHAIN-OF-CUSTODY RECORD

11685

Project Name: <i>Ch. Aenden Mills</i> Site Location: <i>Fericho, VT</i>	Reporting Address: <i>Griffin</i>	Billing Address: <i>Griffin</i>
Endyne Project Number: <i>GICM1340</i>	Company: <i>Griffin</i> Contact Name/Phone #: <i>865-4288</i>	Sampler Name: <i>J. Bearhard</i> Phone #: <i>Sadie</i>

[illegible]

Relinquished by: Signature <i>J. B. C.</i>	Received by: Signature <i>M. Chambers</i>	Date/Time <i>9/8/94 12:00</i>
Relinquished by: Signature	Received by: Signature	Date/Time

Requested Analyses

[illegible]